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Impact of the COVID-19 pandemic on the operations of commercial banks in Poland

Abstract

The impact of the COVID-19 pandemic on profitability, financial results and stability of commercial banks was analyzed. An extensive review of domestic and foreign publications on this subject was carried out; and with regard to commercial banks in Poland, monthly reporting data (from March 2020 to July 2021) was analysed using the least squares method (*ordinary least squares*, OLS). The OLS method choice was dictated by the nature of data and the results of statistical tests. The results showed that the profitability analyzed with ROA and ROE indicators was, in the analyzed period, negatively related to the number of cases, while the net interest income was negatively related to both the number of cases and deaths due to COVID-19. There was also no negative impact of the pandemic on the commission income and operating result noted. No negative impact of the COVID-19 epidemic was recorded in terms of the stability measured with the NPL, Z-score and MPLS indicators.

Key words: bank, profitability, stability, pandemic, COVID-19

JEL codes: G21, I15, O16

Wpływ pandemii COVID-19 na działalność banków komercyjnych w Polsce

Streszczenie

Analizie poddano wpływ pandemii COVID-19 na rentowność, wyniki finansowe i stabilność banków komercyjnych. Przeprowadzono szeroki przegląd publikacji krajowych i zagranicznych na ten temat a w odniesieniu do banków komercyjnych w Polsce zanalizowano miesięczne dane sprawozdawcze od marca 2020 r. do lipca 2021 r.) z wykorzystaniem metody najmniejszych kwadratów (ang. OLS). Wybór metody OLS podyktowany był charakterem danych oraz wynikami testów statystycznych. Wyniki wskazały, że rentowność analizowana wskaźnikami ROA i ROE pozostawała w badanym okresie w negatywnej zależności wzglę-

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dem liczby zachorowań, podczas gdy wynik z tytułu odsetek był w negatywnej zależności zarówno względem liczby zachorowań oraz zgonów z powodu COVID-19. Nie odnotowano także negatywnego wpływu pandemii na wynik z tytułu prowizji oraz wynik z działalności operacyjnej. W zakresie stabilności badanej wskaźnikami NPL, Z-score i MPLS nie odnotowano negatywnego wpływu epidemii COVID-19.

Słowa kluczowe: bank, rentowność, stabilność, pandemia, COVID-19

Introduction

About 11 years after the global financial crisis (GFC) from the end of the first decade of the 21st century, another black swan has landed in the economy, this time in the form of the SARS-CoV-2 virus, also known as COVID-19 (Yang et al. 2020, p. 1). The rapid spread of COVID-19 has transformed the health crisis into a social, financial and economic one. The World Bank (2021) estimates that in 2020, global gross domestic product decreased by approximately 4.3%, which was the largest decrease since the end of World War II. It was assumed in the intervention activities that the banking sector was to constitute a protective buffer for households and non-financial enterprises, ensuring adequate financing. Moreover, in addition to the expansionary fiscal policy, it has been assumed that the banking sector will remain stable and will actively support the recovery of economies from the pandemic crisis.

Preliminary analyzes indicate that banks experienced this endogenous shock relatively gently, amongst others, as a result of actions taken by central banks to support banks' liquidity and, in a way, thanks to strengthening of the capital position of the banking sector after the global financial crisis. As Kulińska-Sadłocha, Marcinkowska and Szambelańczyk (2020, pp. 54–55) indicate, the high level of advancement of electronic banking and mobile is also worth taking into account, which, compared to other sectors, was undoubtedly a factor facilitating the use of banking services during the lockdown and restrictions in an uninterrupted manner.

The purpose of this study is to assess the impact of the COVID-19 pandemic on the Polish commercial banks in the period from March 2020, i.e. the first case of the virus detection in Poland, to July 2021. The research was based on the reporting data of commercial banks due to the fact that their assets constituted about 90% of the assets of the entire banking sector. The main purpose of the study was accompanied by the following hypotheses:

- H1: the COVID-19 pandemic negatively affected the profitability and financial results of commercial banks in Poland;
- H2: the COVID-19 pandemic negatively affected the stability of commercial banks in Poland.

In the first part of the study, the literature on the discussed issues was reviewed, then collected data was calculated using the least squares method and the results of the calculations were presented. The final part presents conclusions and

recommendations for further research. The study uses data published by the Polish Financial Supervision Authority (KNF), the Central Statistical Office (GUS), the World Health Organization (WHO) and the National Bank of Poland (NBP).

1. Review of the subject literature on the impact of the COVID-19 pandemic

The analysis of the consequences of the COVID-19 pandemic for the Polish banking sector was carried out, among others, by Kulińska-Sadłocha et al. (2020, pp. 54–55), characterizing the interventions taken to maintain the continuity of banking functions. Moreover, the financial situation of banks in Poland was compared in two periods, i.e. before the start of the COVID-19 pandemic and after taking relief measures. As the authors point out, as a result of the actions taken, banks reported, inter alia, an increase in other operating expenses, LCR and NPL liquidity ratios with a decrease in ROA, ROE and assets in the debt instruments category. There was also lending policy criteria tightening, in particular in relation to new customers and customers who were exposed to financial problems due to the consequences of the pandemic. The postulates suggested to use fiscal stimulus to limit the restrictiveness of banks' lending policy.

Hryckiewicz and Olszak (2021, p. 180) stated that the COVID-19 pandemic had an adverse effect on bank lending. The largest decreases in financing concerned enterprises and households. Sales of operating loans to large and small and medium-sized enterprises (SMEs) were found to have decreased since the pandemic began by around 13.5% and 13.1%, respectively. In the group of households, the sale of consumer loans decreased the most – by approximately 3.3%. The authors estimated that the decline in lending during the first months of the COVID-19 pandemic was greater than in the case of GFC.

Solarz and Waliszewski (2020, pp. 95–98) analyzed the effects of the COVID-19 pandemic through the prism of systemic risk, by claiming that the resulting economic recession and growing social problems generate systemic risk, among others, due to the spread mechanism, the scope and scale of the impact, and the difficulties in containing threats. They suggested that overcoming the COVID-19 pandemic requires coordinated actions – not only in epidemiological terms, but also in financial, economic and social spheres. They also emphasized that local governments play a very important role in managing systemic risk during the COVID-19 epidemic.

From a perspective that goes beyond Poland, research on the stability of banks during the COVID-19 pandemic was carried out, among others, by Elnahass, Trinh, and Li (2021, pp. 1–3, 21–22). In their research sample, they used quarterly data for 2019–2020 from 1090 banks operating in 116 countries. The obtained results indicated that the COVID-19 pandemic had a negative impact, among others, on the ROA ratio, ROE, market price to book value (P/BV), as well as on the Z-score

and NPL. The authors also decomposed data aggregated according to the continent criterion, the level of economic development (developed and developing countries), the size of the bank (small and large) or religion (conventional and Islamic banks) and they found similar regularities in the selected subgroups.

The article by Korzeba, Niedziółka, and Silva (2021, pp. 227–228, 240) assessed the impact of the COVID-19 pandemic on the financial situation of 19 Portuguese banks. The obtained results indicated that individual banks reacted to the pandemic shock to an unequal degree. According to the value of assets, none of the four largest Portuguese banks belonged to the group of institutions most resistant to the pandemic crisis, which may indicate an increase in systemic risk while prolonged pandemic.

Baret, Celner, O'Reilly and Shilling (2020, p. 6) stated that the increase in the value of risk-weighted assets may result from large fluctuations in the economy and an increase in counterparty risk. In their opinion, a further GDP decline will lead to a decline in loan sales, what combined with low interest rates, will most likely reduce banks' interest margins, and all this, despite liquidity-enhancing interventions, may increase the number of banks failing the stress tests.

Acharya, Engle, and Steffen (2021, pp. 1, 40–41) examined the relationship between the value of credit lines and the value of US banks' shares during the COVID-19 pandemic. The results showed that the decline in share prices occurred primarily in those banks that had open credit lines. Moreover, despite the assistance measures taken, these banks significantly reduced their lending. Similar research in the field of, inter alia, credit lines was conducted by Acharya and Steffen (2020). In the case of full use of credit lines by enterprises, it was found that the ratio of Tier 1 capital to risk-weighted assets may drop to the level of around 10–11%, and in the case of some banks even below 8%.

Rizwan, Ahmad and Ashraf (2020, pp. 1–2, 6–7) analyzed the banking sectors of China, France, Spain, Germany, Canada, Italy, the United States and the United Kingdom in terms of systemic risk. From December 2019 to April 2020, the systemic risk in the banking sector in the analyzed sectors was at a higher level than during the 2007–2009 GKC, although the intervention measures undertaken at the end of Q1 2020 limited the increase in this risk.

The monograph by Carletti, Claessens, Fatas and Vives (2020, p. 19) showed that the COVID-19 pandemic accelerated the trends in the advancement of digitization of banking services, thus increasing their competitiveness. At the same time, small and medium-sized banks that have problems with financing costly technological investments found themselves in a particularly difficult situation.

Aldasoro, Fender, Hardy, and Tarashev (2020, pp. 1, 6), found – based on bank stock prices, credit default swap (CDS) spreads, and financing costs – that the covid breakdown was tantamount to the one of the Lehman Brothers investment bank in the second half of 2008. They noted that with the start of the COVID-19 pandemic, bank stock prices fell more than those of companies in other sectors. On the other

hand, the CDS market was strongly dependent on the ROA level of the pre-pandemic banks and the method of their financing. Low CDS spreads existed for banks that achieved higher profitability before the pandemic and for banks that relied on long-term funding. Moreover, it was found that banks with "healthy" balance sheets benefited the most from various types of assistance measures.

Ari, Chen, and Ratnovski (2020, pp. 1, 6–7) warn that effective and efficient management of low-quality loans (NPLs) can be a significant challenge in the event of a prolonged pandemic and economic downturn.

On the other hand, Dooseman, Marchat, and Guillard (2020) argue that the COVID-19 pandemic may make it necessary to adjust the models of credit risk assessment and its parameters (e.g. probability of default or loss given default) to new economic conditions. In terms of operational risk, the authors noted that the COVID-19 pandemic, which accelerated digital transformation, increased also cyber risk. Moreover, Dooseman et al. (2020) indicated that providing banks with adequate liquidity will be a key element of their continued and stable operation in the current pandemic crisis.

In the study by Hardy and Takats (2020, pp. 89–90, 98), on the basis of aggregate data, it was found that at the initial stage of the pandemic banks were the first line of defense, as there was no significant decrease in funding, among others, for entities from the non-financial sector. Though, they did not reject the scenario in which successive waves of COVID-19 may lead to lockdowns and in consequence to a slowdown in economic processes, especially in the case of limiting lending.

Apart from the characterized research, many publications concern the situation on the stock exchange. For instance, Bernardelli, Korzeb, Niedziółka (2021, pp. 335–336) analyzed investors' decisions based on the listings of 12 Polish banks on the Warsaw Stock Exchange in the period from January to June 2020. In the initial phase of the pandemic crisis, stocks of banks with low regulatory capital characterized by an average level of liquidity, as well as, medium-sized banks in terms of the value of assets, in whose loan portfolios corporate loans dominated, were perceived the worst by investors. The situation normalized only after the government took anti-covid measures. Similar conclusions were reached by Demirguc-Kunta, Pedraza and Ruiz-Ortega (2020, pp. 27–29), who analyzed the prices of banks' shares in 53 countries, and concluded that the outbreak of the COVID-19 pandemic had a particularly negative impact on banks compared to non-financial entities, although the shock was limited thanks to the provision of liquidity to banks and the undertaking of an expansionary monetary policy by central banks.

Moreover, Al-Awadhi, Alsaifi, Al-Awadhi and Alhammadi (2020, pp. 1–2, 4) analyzed the impact of COVID-19 on the stock market in China. Based on an analysis of the stocks included in the Hang Seng and Shanghai Stock Exchange Composite Indexes, they concluded that COVID-19 had a negative impact on rates of return. They also noted that the rates of return negatively correlate, in particular, with the daily number of confirmed infections and deaths caused by COVID-19. Similar studies

and results on the impact of COVID-19 on stock exchanges were carried out, among others, by Ashraf (2020, pp. 1–2, 5–6). The results that he obtained also showed a negative relationship between the rate of return and the number of confirmed COVID-19 cases. Chen, Chen, Tang, and Huang (2007), Chen, Jang, and Kim (2008) also conducted research on the impact of COVID-19 on stock exchanges. Ichev and Marinč (2018, p.1) carried out research in cases of other pandemic diseases, they observed a decline in share prices of companies operating in the Ebola virus area.

According to the Report on the stability of the financial system of the National Bank of Poland (2020, pp. 6–7), the COVID-19 pandemic did not significantly affect the stability of the financial system in Poland, however the risk of worsening of the situation still exists. According to this report, there was no decrease in loan sales, although the covid shock worsens the financial situation, especially of banks with low capital. Moreover, according to the study by the Polish Bank Association (2020, pp. 17–20), electronic and mobile banking functioned correctly, supporting clients during lockdowns and limiting the adverse consequences of the pandemic.

2. Methodology, data and research results

This section describes the author's own empirical study of the impact of the COVID-19 pandemic on profitability ratios, financial results and measures of the stability of commercial banks in Poland. The analysis covers the period from March 2020 to July 2021 and includes monthly reporting data. The beginning of the research, dated to March, results from the first cases of COVID-19 cases and deaths in Poland. The reporting data are taken from the publications of the Polish Financial Supervision Authority, GUS, WHO and NBP. The results of the statistical tests are included in the appendix.

2.1. Impact of the COVID-19 pandemic on the profitability, financial performance and stability of commercial banks

Due to the research period of less than one and a half years, the available monthly reporting data was used, which made it possible to obtain a time series including 17 observations. The adopted solution limited the possibility of using variables such as, for instance, gross domestic product or GDP per capita. The reporting data was not panel-based, so it was decided to use the classic least squares method to verify the hypotheses formulated in the scientific description. For dependent variables in the scope of:

- profitability and financial results (PROF.M) were assumed: return on assets y/y (ROA, see Gospodarowicz, Nosowski, 2012, p. 223), return on equity y/y (ROE, see Gospodarowicz, Nosowski, 2012, p. 224), net interest income y/y, net commission income y/y and operating result y/y,

- bank stability (STAB.M), were assumed: the level of non-performing loans (NPL, see Gospodarowicz, Nosowski, 2012, p. 229), the Z-score stability index (see Miklaszewska, Kil, Idzik, 2021, p. 10) and the comprehensive bank health indicator (*multi-level performance score*, MLPS, see Miklaszewska, Kil, Idzik, 2021, 2021, pp. 10–11).

Based on the literature on the subject and the availability of monthly data, 24 independent variables were selected at the preliminary selection stage, including 2 COVID-19 variables, 9 macroeconomic variables and 13 variables characterizing the activity of commercial banks. Based on the analysis of the values of the correlation matrix and the collinearity test (*variance inflation factor*, VIF), the analysis finally used 2 covid variables, 2 macroeconomic variables and 4 variables related to the functioning of banks. Due to the adopted delays of the independent variables (shifts by one month) the number of monthly observations in the model estimates is 16 months. The description and characteristics of the dependent and independent variables are presented in Table 1.

Table 1. Characteristics of the dependent and independent variables used in the study

Variable	Description	Data source	Concepts or research relating to a variable
Dependent variables – PROF.M			
ROA	Return on assets	PFSA	Elnahass, Trinh, Li (2021); Ari, Chen, Ratnovski (2021); Dursun – de Neef, Schandlbauer (2021); Miklaszewska, Kil, Idzik (2021)
ROE	Return on equity		Elnahass, Trinh, Li (2021); Ari, Chen, Ratnovski (2021); Dursun –de Neef , Schandlbauer (2021), Korzeb, Niedziółka (2021); Miklaszewska, Kil, Idzik (2021)
NII	Net interest income		–
NCI	Net commission income		–
OP	Operating profit		–
Dependent variables – STAB.M			
NPL	Non–performing loans to total loans	PFSA	Elnahass, Trinh, Li (2021); Dursun – de Neef, Schandlbauer (2021); Korzeb, Niedziółka (2021); Miklaszewska, Kil, Idzik (2021)

Table 1 – continuation

Variable	Description	Data source	Concepts or research relating to a variable
Z– score	Stability ratio based on the financial performance and leverage of the bank		Elnahass, Trinh, Li (2021); Karkowska, Korolczuk (2017); Miklaszewska, Kil, Idzik (2021)
MPLS	Comprehensive bank health indicator		Miklaszewska, Kil, Idzik (2021)
Independent variables – LN_COVID19			
LN_COVID_NC_t–1	Natural logarithm of the sum of the monthly number of new COVID-19 cases	*https://covid19.who.int/region/euro/country/pl (accessed on 02/10/2021)*	–
LN_COVID_ND_t–1	The natural logarithm of the sum of the monthly number of new COVID-19 deaths		–
Independent variables – ZM_MACROECON			
BC_R_t–1	NBP reference rate	NBP	–
BC_TA_t–1	Dynamics of changes in the balance sheet total of NBP		–
Independent variables – ZM_BANK			
LOANS_chg_t–1	Dynamics of changes in credits and loans	PFSA	Korzeb, Niedziółka (2021)
CI_t–1	Costs to revenues ratio		Elnahass, Trinh, Li (2021); Miklaszewska, Kil, Idzik (2021); Bernardelli, Korzeb, Niedziółka (2021)
EQ_TA_t–1	Equity to the balance sheet total of commercial banks		Dursun – de Neef, Schandlbauer (2021); Miklaszewska, Kil, Idzik (2021)
II_chg_t–1	Dynamics of interest income		Ari, Chen, Ratnovski (2021)

Source: own study.

The functional forms of the analyzed models were described by the formula (1) and (2).

$$PROF.M_{it} = \alpha + \beta_1 LN\_COVID19_{i,t-1} + \beta_2 ZM\_MAKROEKON_{i,t-1} + \beta_3 ZM\_BANK_{i,t-1} + \varepsilon_{it} \quad (1)$$

$$STAB.M_{it} = \alpha + \beta_1 LN\_COVID19_{i,t-1} + \beta_2 ZM\_MAKROEKON_{i,t-1} + \beta_3 ZM\_BANK_{i,t-1} + \varepsilon_{it} \quad (2)$$

Where:

PROF.M – measure of profitability and financial results expressed by the ROA, ROE ratios, net interest income, net commission income and operating result;
STAB.M – stability measure expressed by the NPL, Z-score or MLPS index;
LN_COVID19 – the natural logarithm of the sum of monthly COVID-19 cases or the natural logarithm of the sum of recorded deaths due to COVID-19;
ZM_MACROECON – vector of macroeconomic variables described in Table 1;
ZM_BANK – vector of variables describing the activities of commercial banks described in Table 1.

In the analyzed period, the explanatory variable ROA and ROE was adversely affected by the number of monthly COVID-19 cases (models 1, 3), the dynamics of changes in loans and borrowings (models 1,2, 4) and the ratio of equity to total assets (models 1–4). A positive relationship for ROA and ROE was noted for the NBP reference rate (models 2, 4) and the dynamics of interest income (models 1–4). In the case of the C/I ratio parameter, its interpretation is in contradiction to the theoretical assumptions, which could have been influenced by a relatively short series of observations, in which there was a simultaneous decline in ROA, ROE and C/I.

The number of monthly cases and deaths due to COVID-19 had a negative impact on the result on the interest of commercial banks (models 5–6). This can be interpreted by the increase in non-performing loans in the first months of the pandemic. It could also result, inter alia, from the reduction of the reference rate by the NBP, because, as shown by the model, the net interest income and the net commission income remained in a positive relation to it in the analyzed period (models 5–8). For the net interest income and net commission income, there was also noted a negative correlation with the C/I ratio and with the dynamics of interest income (models 5–8). The equity-to-assets ratio was positively correlated with the net interest income (models 5–6) and correlated negatively with the net commission income (models 7–8).

In the case of the operating result, the model proved a negative relationship for the ratio of equity to total assets (models 9–10) and a positive relationship for the dynamics of interest income (models 9–10).

The analysis of profitability ratios and financial results made it impossible to unambiguously verify the H1 hypothesis. Therefore, the overall assessment of the

H1 hypothesis was replaced with its individual components. Thus, it was found that the H1 hypothesis was:

- positively verified for ROA, ROE indicators and net interest income in terms of the number of new COVID 19 cases (models 1, 3, 5),
- positively verified for the net interest result in relation to the number of new deaths from COVID-19 (model 6),
- negatively verified for ROA and ROE indicators in terms of the number of new deaths from COVID-19 (models 2, 4) and the result on interest and operating result for both covid variables (models 7–10).

In relation to the variables characterizing the stability of commercial banks, no negative impact of the COVID-19 pandemic on NPL, Z-score and MLPS (models 11–16) was recorded in the analyzed period. This gave rise to a negative verification of the H2 hypothesis. The significant variables independent of the NPL were the dynamics of the change in the balance sheet total of the NBP, the increase of which led to a decrease in non-performing loans (models 11–12). A negative correlation was also noted for the NBP reference rate (models 11–12). This could be related to the fact that despite the MPC (The Monetary Policy Council) lowering the interest rates, the level of non-performing loans was rising at the beginning of the analyzed period. There was a positive relationship with NPL for the C/I ratio and the ratio of equity to balance sheet total (models 11–12).

It was observed that the increase in the NBP reference rate was positively related to the MLPS index. On the other hand, the ratio of equity to total assets was negatively related to MLPS.

Table 2. Estimation results of eight models for the dependent variable ROA, ROE, net interest income and net commission income for a series of 16 observations from April 2020 to July 2021

Independent variables	Dependent variable / model designation							
	ROA / 1	ROA / 2	ROE / 3	ROE / 4	NII / 5	NII / 6	NCI / 7	NCI / 8
const	0.061*** (0.01)	0.073*** (0.011)	0.59*** (0.093)	0.7*** (0.102)	-0.775*** (0.112)	-0.634*** (0.17)	1.32*** (0.056)	1.188*** (0.065
LN_COVID_ NC_t-1	-4.89E-04* (2.47E-04)		-0.005* (0.002)		-0.008*** (0.002)		0.006*** (0.001)	
LN_COVID_ ND_t-1		-5.74E-04 (3.19E-04)		-0.006 (0.003)		-0.007** (0.003)		0.007*** (0.001)
BC_R_t-1	0.28 (0.182)	0.37** (0.15)	2.412 (1,731)	3,292* (1,433)	5.689** (1,968)	7.477*** (1,952)	8.519*** (1,238)	7.467*** (1,155)
BC_TA_t-1	0.01 (0.01)	0.011 (0.01)	0.093 (0.097)	0.104 (0.1)	-0.056 (0.077)	-0.034 (0.082)	0.052 (0.069)	0.039 (0.07)
LOANS_chg_t-1	-0.046* (0.021)	-0.071*** (0.014)	-0.361 (0.205)	-0.598*** (0.132)	0.287 (0.46)	-0.059 (0.471)	-0.661 * (0.323)	-0.376 (0.319)
CI_t-1	0.027** (0.009)	0.026** (0.008)	0.234** (0.084)	0.221** (0.075)	-0.647*** (0.047)	-0.692*** (0.055)	-0.175*** (0.034)	-0.158*** (0.034)
EQ_TA_t-1	-0.732*** (0.081)	-0.853*** (0.104)	-6.874*** (0.754)	-8.041*** (0.97)	11.335*** (1,149)	9.817*** (1,501)	-11.977*** (0.611)	-10.579*** (0.643)
II_chg_t-1	0.002* (0.001)	0.002* (0.001)	0.016* (0.008)	0.013* (0.007)	-0.028*** (0.005)	-0.034*** (0.005)	-0.016*** (0.004)	-0.013*** (0.003)
Specification	**Model parameters**							
Skor. R-square	0.735	0.727	0.727	0.716	0.955	0.94	0.926	0.92
F-test	0	0	0	0	0	0	0	0
VIF (max.)	5.243	4.507	5.243	4.507	5.243	4.507	5.243	4.507

Note: The values in parentheses are heterocadastic standard errors.

Source: own elaboration. Number of observations in models 1–8: 16.

Table 3. The results of model estimation for the dependent variable operating profit, NPL, Z-score and MLPS – models 9-16 depending on the adopted set of explanatory variables

Independent variable	Dependent variable / model designation							
	OP/9	**OP/10**	**NPL/11**	**NPL/12**	**Z-score/13**	**Z-score/14**	**MLPS/15**	**MLPS/16**
const	10.72*** (1,473)	11.735*** (1,473)	-0.005 (0.005)	-0.005 (0.008)	-109.861 (632,965)	-344.512 (653,019)	206.915*** (16.51)	220.855*** (21,834)
LN_COVID_ NC_t-1	-0.053 (0.031)		1.32E-04 (7.42E-05)		15.872 (9,238)		-0.802 (0.44)	
LN_COVID_ ND_t-1		-0.053 (0.04)		2.61E-05 (1.34E-04)		12.795 (9,046)		-0.736 (0.651)
BC_R_t-1	-5.798 (24,766)	5.848 (21,403)	-0.527*** (0.078)	-0.579*** (0.078)	9005 (10,724.6)	4,822.54 (9,338.92)	1458.85*** (355,706)	1650.8*** (304,455)
BC_TA_t-1	1.068 (0.879)	1.215 (0.942)	-0.007* (0.003)	-0.007* (0.003)	422.574 (518,637)	371.315 (502.47)	16.383 (15,939)	18.775 (17,196)
LOANS_chg_t-1	1.464 (4,186)	-0.943 (3,361)	0.003 (0.018)	0.006 (0.016)	-4246.53 (2,732.92)	-3594.61 (2,583.38)	-83.576 (54.764)	-118.686** (44,878)
CI_t-1	4.688*** (0.97)	4.414*** (0.905)	0.011*** (0.002)	0.013*** (0.003)	2300.82*** (328,702)	2426.68*** (327,384)	28.968 (16,656)	23.862 (15,136)
EQ_TA_t-1	-128.301*** (12,182)	-139.165*** (12,911)	0.603*** (0.046)	0.606*** (0.064)	-11,437.2 (6229.92)	-8862.98 (6,022.12)	-2249.41*** (132,049)	-2399.96*** (203,542)
II_chg_t-1	0.554*** (0.092)	0.518*** (0.076)	3.68E-04* (1.96E-04)	0.001** (2.14E-04)	-58.236* (25,465)	-45.498* (23,891)	1.712 (1,806)	1.124 (1,538)
Skor. R-square	0.888	0.877	0.829	0.812	0.674	0.65	0.826	0.808
F-test	0	0	0	0	0	0	0	0
VIF (max.)	5.243	4.507	5.243	4.507	5.243	4.507	5.243	4.507

Source: own study. Heterocadastically compatible standard errors are given in brackets. The number of observations in the 9–16 models: 16.

Summary

The aim of the study was to assess the short-term impact of the COVID-19 pandemic on the operations of commercial banks in Poland.

An unambiguous verification of the H1 hypothesis was impossible, therefore an attempt to decompose it and evaluate its individual components was made. On the basis of the above assumption, it was found that the negative impact of the COVID-19 pandemic, expressed in the number of new cases of SARS-CoV-2 virus, was recorded in relation to the ROA and ROE indicators and to the result on interest. The analysis indicated also that the net interest income was also negatively affected by the number of new deaths due to COVID-19. On the other hand, the quantitative study negatively verified the H1 hypothesis in terms of the relationship between ROA and ROE and the number of new deaths due to COVID-19. In the case of commission and operating result, verification of the H1 hypothesis was also negative for both covid variables.

With regard to the measures of stability of commercial banks, i.e. NPL, Z-score and MLPS, the H2 hypothesis was negatively verified, which can be interpreted as meaning that the COVID-19 pandemic did not contribute to a significant deterioration of the stability of Polish commercial banks in the analyzed period.

The results of the analyzes are similar to the results of other studies. For instance, Elnahass, Trinh and Li (2021) obtained the same results for ROA and ROE indicators, but different for NPL and Z-score. It should be noted that in this study only commercial banks in Poland were studied, while in the analysis by Elnahass, Trinha and Li (2021), the base was 1090 banks from 116 countries. Whereas, compared to the analyzes by Baret, Celner, O'Reillie and Shilling (2020), the same results were obtained for central bank interest rates (their reduction after the COVID-19 pandemic resulted in a decrease in banks' net interest income). Acharya, Engle, and Steffen (2021) found that the COVID-19 pandemic limited bank lending. Similar conclusions were formulated by Hryckiewicz and Olszak (2021). Only in the first months of the pandemic, the Polish sector of commercial banks saw a decline in the growth rate of loans and advances, as after about 6 months this ratio began to increase again, especially in relation to the sale of housing loans, which should be associated with the reduction of interest rates by the NBP. What is more, Ari, Chen and Ratnovski (2020) found that the prolonged COVID-19 pandemic significantly increases the risk of an increase in NPL. On the other hand, in the Polish market, in the initial months of the pandemic, an increase in NPLs in the portfolios of commercial banks was observed, but after a few months their level returned to the level from before the pandemic.

Despite the fact that as a result of the COVID-19 pandemic, the profitability and financial results of commercial banks in Poland decreased, mainly in the first months of the COVID-19 epidemic compared to previous years, this did not adversely affect their stability. In the context of interventions and the situation of banks at

the end of 2021, the COVID-19 pandemic appears to have had a rather short-term and temporary impact on the performance of commercial banks. Whereas there are no extraordinary circumstances requiring actions similar to those from the lockdown from 2020, the stability of commercial banks in Poland is not threatened. However, the portfolio of housing loans based on variable interest rates is a factor that constitutes a significant risk factor not only for commercial banks, but also for the entire banking sector. The more that it is highly probable that the MPC will significantly raise interest rates.

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Statistical tables

Table A. Correlation matrix for studying the impact of the COVID-19 pandemic on profitability, financial results and stability of commercial banks

	ROA	ROE	W_OD	W_PR	W_DZ_OP	NPL	Z-score	MLPS	LN_COVID_NC	LN_COVID_ND	BC_R	BC_TA	LOANS_chg	C/I	EQ_TA	II_chg
ROA	1.00															
ROE	1.00	1.00														
NII	-0.49	-0.49	1.00													
NCI	0.68	0.69	-0.76	1.00												
OP	0.85	0.87	-0.77	0.80	1.00											
NPL	-0.76	-0.77	0.19	-0.69	-0.68	1.00										
Z-score	0.44	0.41	-0.49	0.39	0.26	-0.03	1.00									
MLPS	0.95	0.95	-0.42	0.75	0.84	-0.91	0.31	1.00								
LN_COVID_NC	-0.21	-0.21	-0.58	0.16	0.13	0.40	0.29	-0.28	1.00							
LN_COVID_ND	-0.04	-0.03	-0.71	0.39	0.31	0.18	0.32	-0.06	0.93	1.00						
BC_R	0.08	0.06	0.64	-0.17	-0.27	-0.33	0.01	0.18	-0.50	-0.59	1.00					
BC_TA	-0.12	-0.13	0.33	-0.17	-0.26	-0.06	0.02	-0.04	-0.28	-0.24	0.35	1.00				
LOANS_chg	0.50	0.51	-0.17	0.45	0.41	-0.52	0.17	0.51	-0.19	-0.26	0.38	-0.08	1.00			
C / I	0.13	0.09	-0.13	0.24	-0.10	0.04	0.75	0.07	0.18	0.17	0.29	0.18	0.11	1.00		
EQ_TA	-0.49	-0.51	0.90	-0.84	-0.81	0.41	-0.20	-0.52	-0.32	-0.54	0.61	0.27	-0.19	0.09	1.00	
II_chg	0.16	0.16	0.05	-0.12	0.21	-0.21	-0.06	0.22	-0.10	-0.14	0.25	0.11	0.13	-0.43	0.03	1.00

Source: own study.

Table B. Statistics for variables in the study of the impact of the COVID-19 pandemic on profitability, financial results and stability of commercial banks

	mean	Standard deviation	Min.	Max.
ROA	-0.002	0.003	-0.008	0.001
ROE	-0.013	0.023	-0.071	0.017
NII	-0.054	0.074	-0.154	0.069
NCI	0.118	0.036	0.073	0.175
OP	-0.081	0.504	-0.812	0.687
NPL	0.061	0.002	0.057	0.063
Z-score	141.372	134.809	29.030	494,584
MLPS	-6.176	6.766	-18,000	5,000
LN_COVID_NC	10.740	1.927	7.745	13.350
LN_COVID_ND	7.300	1.829	3.497	9.579
BC_R	0.002	0.003	0.001	0.013
BC_TA	0.025	0.037	-0.047	0.102
LOANS_chg	0.001	0.011	-0.017	0.024
C / I	0.517	0.042	0.482	0.649
EQ_TA	0.099	0.004	0.093	0.105
II_chg	0.200	0.357	-0.920	0.911

Source: own study